Fundamental Technologies for the Development of Biomolecular Sensors

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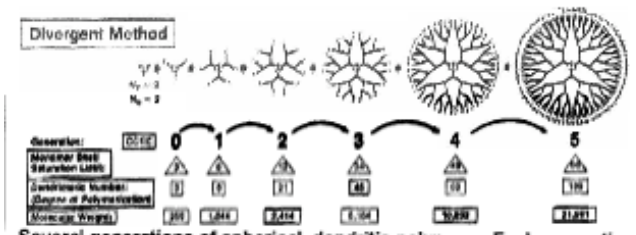
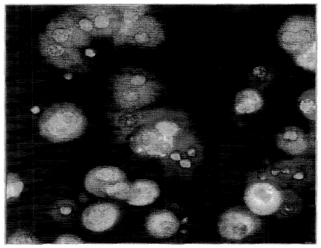
Biomolecular Systems Research Program



Several generations of spherical, dendritic polymers. Each generation increases the size, molecular weight and number of primary amine groups on the surface of the polymer.



Multiprobe fluorescence of isolated hepatocytes. The photograph is an example of the composite fluorescence of 4 probe with pseudocolor assigned to the corresponding peak emission characteristics of each dye. Nuclei are in blue (Hoechst 33342), lysosomes in green (lysotracker), mitochondria in orange (TMRM) and plasma membrane permeability

Description

1. Development of Antibody-Dendrimer-Dye conjugate Biosensors.
2. In-vivo testing of targeted conjugates using Microscopic Multispectral Analysis.
3. Development of a Laser Monitoring Systems.

Innovative Claims/NASA Significance

We propose to develop a biosensor that would be loaded into the lymphocytes of astronauts. This biosensor would measure the viability of lymphocytes and identify early events associated with radiation exposure, such as alterations of mitochondrial calcium mobilization. In addition, the sensor could also identify activated caspase activity within lymphocytes; an event documenting irreversible apoptosis. This signal would be monitored non-invasively using laser light directed at a laminar-flow stream of blood cells in a capillary. The system would hnction like a flow cytometer, but withouthe need for large equipment. It could be used for additional non-invasive measurement of other blood parameters, such as neutrophil activation as a reliable
sign of infection.

Plans

Work and Milestone Timetable